APPENDIX C
Grain Grading

Scoring
Scoring of each sample will be as follows:

Grade Designation (30 points)
- Crop name omitted, deduct 15 points
- Wrong class or class omitted, deduct 5 points
- Special grade wrong or omitted, deduct 3 points each (not more than 6 points)
- One grade off, deduct 5 points
- Two grades off, deduct 10 points
- Three or more grades off, deduct 15 points
    - Correct grade wrongly written, deduct 1 point for each of the following (up to 4 points):
    - Wrong abbreviation for "U.S. No."
    - Wrong term used
    - Words not listed alphabetically
    - Incorrect punctuation
    - Words misspelled
    - All words not capitalized.

Grade Factors (20 points)
- One factor required: Wrong, deduct 16 points
- Two factors required: One wrong, deduct 8 points; Both wrong, deduct 16 points
- Three factors required: One wrong, deduct 5 points; Two wrong, deduct 10 points; Three wrong, deduct 16 points
- Four factors required: One wrong, deduct 4 points; Two wrong, deduct 8 points; Three wrong, deduct 12 points; Four wrong, deduct 16 points
- If more factors are listed than required, value of each wrong extra factor will be 16 divided by the total number of factors listed (dropping any fraction). For example, if two are required by four are listed, deduct 16/4 = 4 points for each wrong factor.
- Grade determining factors, wrongly written, deduct 1 point for each of the following errors (up to 4 points):
    - Wrong percent given
    - Wrong term used (Abbreviations of factors are acceptable and not considered wrong if the proper abbreviation is used-Find correct abbreviations after the EXAMPLE section)
    - All words not capitalized
    - Factors not listed alphabetically
    - Words misspelled
    - "()", "%" omitted.

Explanations
Grain is graded for marketing purposes according to a set of requirements, established by the U.S. Department of Agriculture's Federal Grain Inspection Service (FGIS), called the Official U.S. Standards for Grain. The purpose of grading grain is to assign a label to it, known as the grade designation, which indicates its quality and determines its market value. Following is an explanation of the grading standards for wheat, sorghum, corn, and soybeans in a simplified form, taken from the U.S. Grain Standards for these crops.

Grades: Samples of grain are placed in numerical grades, ranging from U.S. No. 1 to U.S. No.

5, or Sample Grade, depending on quality. Certain factors or quality characteristics must be measured for each sample of grain, and the degree of quality of each factor is compared to the values listed in the grade requirements chart. The numerical grade for each factor on the table must be properly recorded.

Numerical Grading Factors: The numerical grading factors are the quality characteristics that determine the grade number assigned to a sample of grain. They are the column headings on the grade requirement charts, and most of them apply to all of the grains to be graded, although the limits may differ from one grain to another. The grade assigned to a sample is always based on the most serious factor or factors.

Test Weight Per Bushel: Test weight is the weight in pounds of an exact bushel volume of grain. Usually a one quart container is filled and weighed, with the weight converted to pounds per bushel. A bushel of dry, clean, plump grain will weigh more than an equal quantity of grain which is shriveled, hollowed out by insects, or high in moisture. Thus, a high test weight indicates good quality and a high numerical grade, while low test weight places the sample in a lower grade.

Damaged Kernels: Damaged kernels are those which for some reason may be considered unfit for food or feed purposes. There are many types of grain damage, but we will be concerned primarily with those included in the identification list (heat, sprout, mold, and insect damage). Of these, **<u>Heat-damaged Kernels</u>** are considered especially serious, and are handled as a separate factor in each of the grade requirements charts. The other kinds of damage are grouped together, and along with heat damage, are classified as total damage. Therefore, heat damage must be considered by itself, then added to any other kind of damage present, and considered as part of the numerical grading factor for **Damaged Kernels (Total)**. Other colors or market classes of the grain being graded which are damaged must also be included in Damaged Kernels (Total). In grading of corn, only damaged kernels of corn, and in soybeans, only damaged kernels of soybeans, are included as damaged kernels. However, in grading of wheat or sorghum, any of the kinds of damaged kernels of other grains on the identification list are included as part of the numerical factor for either Heat-damaged Kernels or Damaged Kernels (Total). For example, in grading corn, sprout-damaged wheat in the sample does not count as damaged kernels, but in grading sorghum, sprout-damaged wheat is included as damaged kernels, either by itself or added to any damaged sorghum present. (The wheat is also considered as foreign material in either case). Heat-damaged Kernels are those which are distinctly black or brown due to high temperatures which build up in "hot spots" in damp grain stored for long periods. Sprout-damaged kernels are those which germinate on the plant during very wet conditions which delay harvest and which dry out later killing the germ. Kernels on which mold or other diseases have been growing are also considered as damaged kernels. Kernels are considered insect-damaged if the insect has eaten a tunnel, hold, or cavity which is not fully exposed.

Foreign Material/Broken Corn and Foreign Material/Broken Kernels and Foreign Material: Foreign material includes all matter in the sample except the kind of grain which is being graded. Fine material, dirt, small pieces of broken grain, pieces of stems, hulls, weed seeds, and any other grains are all considered foreign material. Some of these may be separated by mechanical screening or sieving. Each crop differs slightly in the way foreign material and broken kernels are separated and defined. In **soybeans**, the factor **Foreign Material** consists of fine material screened out which is given as a card factor plus any visual foreign material (other crops,

weed seed, etc.) shown on the grading card. In **wheat**, the factor **Foreign Material** consists only of visual factors, since the fine material is removed as dockage. In **corn**, the factor **Broken Corn and Foreign Material** consists of broken corn and fine foreign material screened out which will be given as card factors plus any visual foreign material shown on the card. In **sorghum**, there are two factors of concern. The factor **Foreign Material** includes coarse foreign material screened out which will be given as a card factor plus any visual foreign material shown on the card. The factor **Broken Kernels and Foreign Material** also includes a fine broken kernels portion screened out which will also be given as a card factor. In wheat and sorghum, visual demonstrations of other grains which are damaged are counted both as Foreign Material and Damaged Kernels (Total).

Shrunken and Broken Kernels in wheat is used as a numerical factor. This is determined by sieving, and is given as a card factor on every sample of wheat.

Defects (Total), as a numerical factor in wheat, is the sum of the Damaged Kernels (Total), Foreign Material, and Shrunken and Broken Kernels added together. It should be noted that the limits for Defects (Total) in the grade requirements for wheat are the same as for Shrunken and Broken Kernels. Thus, if the percent of Shrunken and Broken Kernels alone determines the numerical grade, Defects (Total) must also be listed as a determining factor. Heat-damaged kernels are a part of Defects (Total), but do not need to be added again since they should already have been included as a part of the Damaged Kernels (Total).

Contrasting Classes in wheat refers to the presence of Durum Wheat or Hard White Wheat or Soft WhiteWheat in Hard Red Winter Wheat, which would reduce the quality of a sample of Hard Red Winter Wheat for bread making. A sample cannot be graded lower than U.S. No. 4 because of Contrasting Classes. If it contains more than 10% Contrasting Classes, the sample is classified as Mixed Wheat, and then it is regarded with the factor Contrasting Classes disregarded.

Splits in soybeans are broken pieces of soybeans in the sample that are not otherwise damaged (i.e. mold, insect, etc.) They are considered objectionable and lower the grade of the sample because the oil in the broken pieces is oxidized, reducing the quality of the soybean oil when extracted. They will be shown as one of the visual factors. If split kernels are, in fact, also damaged in some other way, they must be considered as Damaged Kernels (Total) instead of Splits.

Soybeans of Other Colors refers to Brown or Black Soybeans in a sample of Yellow Soybeans. This factor will be demonstrated as a visual factor or may be given as a card factor for Black or Brown Soybeans. A sample cannot be graded lower than U.S. No. 4 because of Soybeans of Other Colors. If it contains more than 10% Soybeans of Other Colors, the sample is classified as Mixed Soybeans, and it is then regarded with the factor Soybeans of Other Colors disregarded. (Note: brown soybeans and black soybeans are not on the identification list, but may still appear in the grain grading section.)

SAMPLE GRADE FACTORS

Whenever any of the numerical grading factors on the grade requirements chart exceeds the limits of the lowest grade, except Contrasting Classes in wheat or Soybeans of Other Colors in soybeans, the sample must be placed in Sample Grade. Other factors which would cause a sample to be Sample Grade are discussed below. The descriptions and limitations for sample grade factors are given the paragraph immediately below the

numerical chart in the standards for each crop. Since most of these determinations are made on large portions of the grain or in the elevator, boxcar or barge (i.e. odors, heating, etc.) when the sample is first collected, they will all be given as card factors for the contest. Grain which is Sample Grade is generally considered to be unfit for human food or commercial use. If these non-numerical factors are grade-determining, they must be recorded in the remarks section.

Stones: The presence of 8 or more stones in a 1000-gram sample of any of the grains (4 or more for wheat) places it in Sample Grade. Weight limits also apply for some crops, but will be ignored for the contest. The number of stones per 1000 gram sample will be given as a card factor. Since most grain sold by grade is ground up for food or feed, the presence of stones would be damaging to the processing machinery, and objectionable when found in food products.

Castorbeans, Cockleburs, Crotalaria, Broken Glass, Animal Filth: The presence of any of these materials in a sample of grain is undesirable for either human food or animal feed. Castorbeans and crotalaria are poisonous seeds, broken glass is dangerous, and animal filth is highly objectionable. They are listed specifically as Sample Grade factors in the grading standards charts with appropriate limits per 1000 gram sample. For the contest, they will always be given as card factors with amounts per 1000 grams indicated.

Harmful or Toxic Foreign Substance: This refers mainly to poison-treated seed grain. The chemical mixture applied to seeds for planting to prevent seedling diseases is usually colored a bright pink, purple or green. Its presence causes grains to be graded as Sample Grade because of distinctly low quality. Farmers must be extremely careful to prevent mixing of any left-over treated seed with grain that they feed, and particularly with the grain they sell. If any poison-treated kernels are found, the entire lot (truckload, railroad car or bin full) may be seized by the Federal Food and Drug Administration, and condemned for any feed or food use.

Musty, Sour, or Heating: Each of these terms, which will be given as a card factor, indicates that the grain is in the process of spoiling, and is not in good condition. If present, they should be listed as determining factors for Sample Grade on the right-handed side of the grain grading answer sheet.

Commercially Objectionable Foreign Odors: This term includes any strong odor which the grain may pick up, which stays in it throughout processing, and which remains in the finished product, such as flour or cornmeal, baked goods or soybean oil. The kind of odors which we will include in our grading, all of which will be given as card factors, are smoke odor, skunk odor, oil, gasoline, diesel, or kerosene odor, and dead animal odor (due to tankage, meat scraps, raw hides or dead rodents in the grain). Many of these odors are picked up by storing grain in the sample buildings with these odor-producing materials, or in bins, trucks, or box cars contaminated with them. It should be noted that odors of smut or garlic are not considered to be commercially objectionable.

SPECIAL GRADE FACTORS

Special grades are quality determinations made after the numerical grade has been determined. They indicate some quality feature of the grain which is not included in the grading chart (i.e. Infested, Garlicky, Smutty). When a special grade applies, the proper term for each grain is added to the grade designation, following the class and kind of

grain on the left-handed side of the answer sheet. The quantities or reasons which cause the use of a special grade are never listed as a grading factor on the right-hand side of the answer form (factors included on the right are only those determining the numerical grade). All factors for determining special grades will be stated as card factors, and any evidence which might be found in the master sample must be ignored. Special grades need not be recorded in the remarks section, but must appear with the lot designation.

MARKET CLASSES OF GRAIN

When sold for commercial purposes, each kind of grain is divided into market classes, which indicate the kind of use each sample is best suited for. Classes of corn, sorghum and soybeans are based on color. In wheat, classes are based on differences in texture (hardness) and protein content as well as color. The texture of wheat is determined mainly by the weather and varieties grown, which vary a great deal in different parts of the United States. The cool climate and high rainfall of the Pacific Northwest and of the Northeastern states is best suited to growing Soft White Wheat, which is very low in protein, and is used for crackers, pastries, noodles and breakfast cereals. In Oklahoma and the surrounding states in the Southern Great Plains, we grow Hard Red Winter Wheat, which usually has enough protein for good bread-making. Newly developed Hard White Wheat varieties suitable for bread making are being grown in California and in the Great Plains and may become as popular as Hard Red Winter Wheat. Hard Red SpringWheat is grown in the Northern Great Plains (the Dakotas and Canada) where the dry summers cause the wheat to be high in protein, and ideal for bread-making. Durum Wheat is also grown in the Northern Great Plains and is very hard which makes very good macaroni, spaghetti and noodles. Its protein content is very high, but it is not of suitable quality for making bread. The Eastern states, which have plenty of rainfall, produce Soft Red Winter Wheat, which has low protein content, and is best suited for cookies and cakes. We will grade only samples of Oklahoma-grown Hard Red Winter Wheat, and need to consider only hard White Wheat, Soft White Wheat and Durum Wheat for the grading factor "Contrasting Classes" and the possibility that it may be classified as Mixed Wheat. Although Soft Red Winter and Hard Red Spring mixtures in the Hard Red Winter Wheat may also affect the grade and class, they are difficult to distinguish from one another and will not be used in the grading portion of our contest. Market class need not be recorded in remarks section, but must appear as part of the lot designation.

Classes of corn:
- **Yellow Corn:** Kernels yellow or yellow with reddish areas, containing not more than five percent of white, red, or other-colored kernels.

- **White Corn:** Kernels white or white with pink or yellow tinges with not more than two percent of yellow or other colors.

- **Mixed Corn:** Any sample that does not meet the requirements for the classes Yellow Corn or White Corn.

Classes of sorghum:
- **Sorghum:** Sorghum with white subcoats and yellow, yellow-red, orange-red, salmon-pink, reddish or white pericarps, or white pericarps with black or reddish spots, with not more than three percent of tannin sorghum. White kernels are allowed in any amount in yellow sorghum and do not cause mixed sorghum.

- **Tannin Sorghum:** Sorghum with brown subcoats caused by the presence of tannin with not more than ten percent of sorghum of other colors. Tannin sorghums are identified by the presence of brown subcoats beneath the pericarps and may have pericarps of other colors. However, tannin sorghum used in the contest will have only brown or tan pericarps so they can be distinguished from non-tannin sorghum with reddish pericarps.

- **White Sorghum:** Sorghum with white pericarps with not more than two percent of sorghum of other colors. White sorghum with more than two percent sorghum (yellow, red, orange or salmon pericarps) and less than three percent tannin sorghum is classified as "Sorghum". White kernels may have black, brown, or reddish spots which cover not more than 25% of the kernel.

- **Mixed Sorghum:** Sorghum and/or white sorghum with more than three percent tannin sorghum or tannin sorghum with more than ten percent of other colors.

Classes of soybeans:
- **Yellow Soybeans:** Soybeans with yellow or greenish seed coats with not more than ten percent soybeans of other colors (black and/or brown soybeans).

- **Mixed Soybeans:** Soybeans with more than ten percent soybeans of other colors (black and/or brown soybeans). (Note: Brown Soybeans and Black Soybeans have been removed from the identification list, but may still appear in the grain grading section.)

Classes of wheat:
- **Hard Red Winter Wheat:** Hard Red Winter Wheat with not more than ten percent wheat of Contrasting Classes (Durum and/or Hard or Soft White Wheat).

- **Mixed Wheat:** Hard Red Winter Wheat with more than ten percent Contrasting Classes (Durum and/or Hard or Soft White Wheat). Mixtures of Hard Red Spring and/or Soft Red Winter Wheat at more than ten percent will also cause mixed wheat, however these will not be used in the contest due to the difficulty of distinguishing them, especially if damaged.

Determination of mixtures of classes: The classes (colors) of corn, soybeans and sorghum not matching the master sample, and of Contrasting Classes (Hard and Soft White Wheat and Durum Wheat) in Hard Red Winter Wheat, may be shown as visual factors on the grading cards. Representative market classes for corn, soybeans, sorghum and wheat are included on the ID list. Other classes may also be given as a card factor. Visual class factors such as heat-damaged or mold-damaged kernels in which the color or class is not distinct and easily determined should be considered as the same class as the master sample, and not included as mixed. Definitions of market classes will be provided to contestants with the grade requirement tables.

WRITING THE GRADE DESIGNATION and DETERMINING FACTORS

In order to get full credit, the grade designation must be correctly written. It consists of two parts: the grade designation itself and the determining factors. See the examples written on an official answer form, which go with the practice problems at the end of this section.

The Grade Designation is written as follows on the left-handed side:

1. The numerical grade preceded by the abbreviations "U.S. No." or "U.S. Sample Grade" -- whichever applies.
2. The name of the class and kind of grain (such as "Hard Red Winter Wheat", "White Sorghum" or "Mixed Corn").
3. The Special Grade terms which apply (such as "Infested" or "Smutty"), following a comma after the name of the kind of grain.

The Determining Factor or Factors written on the right-handed side are:

1. The column headings in the grade requirement charts such as "Test Weight Per Bushel", "Damaged Kernels (Total)", or "Defects (Total)" which cause the sample to be placed in the numerical (or sample) grade listed on the left.
2. Factors causing the grain to be graded Sample Grade if appropriate, such as "Musty", "Heating", "Animal Filth", or "Commercially Objectionable Foreign Odor".

All factors which determine the grade chosen should be listed. No factors are given for a sample grading U.S. No. 1. The maximum number of determining factors will be four. Percentages (or lbs for Test Weight Per Bushel) should be stated for each factor in parentheses immediately following. For examples of correctly written grade designations, see the completed official grain grading form on page 22 which follows the examples.

Commercial Grain Grading Answer Sheet

Contestant No._____   Total Score_____

Contestant Name_____

Sample No .	Complete Grade Designation	Factor or Factors
1		
2		
3		
4		
5		
6		

GRADE REQUIREMENTS FOR **CORN**				
		Maximum Limits of …		
Grade	Minimum Test Weight Per Bushel	Heat-damaged Kernels	Damaged Kernels (Total)	Broken Corn and Foreign Material
	Lbs.	%	%	%
U.S. No. 1	56.0	0.1	3.0	2.0
U.S. No. 2	54.0	0.2	5.0	3.0
U.S. No. 3	52.0	0.5	7.0	4.0
U.S. No. 4	49.0	1.0	10.0	5.0
U.S. No. 5	46.0	3.0	15.0	7.0

U.S. Sample Grade shall be designated for corn that:

a) Exceeds the limitations of U.S. No. 5 for any of the above factors; or
b) Contains, in a 1000 gram sample: 8 or more stones; 2 or more castorbeans; 8 or more cockleburs; 2 or more pieces of glass; 3 or more crotalaria seeds; 10 or more rodent pellets, bird droppings, or other pieces of animal filth; or
c) Has a musty, sour, or commercially objectionable foreign odor (does not include smut or garlic odor); or
d) Is heating, contains any commonly recognized harmful or toxic foreign substance, or is otherwise of distinctly low quality.

SPECIAL GRADES
Infested - Infested by live weevils or other live insects injurious to stored grain.

MARKET CLASSES
Yellow Corn - Kernels yellow or yellow with reddish areas, containing not more than five percent of white, red, or other colored kernels.
White Corn - Kernels white or white with pink or yellow tinges with not more than two percent of yellow or other colored kernels.
Mixed Corn - Any sample that does not meet the requirements for the classes Yellow Corn or White Corn.

DEFINITIONS
Heat-damaged Kernels - Heat-damaged kernels of corn only.
Damaged Kernels (Total) - Kernels of corn only which are damaged by insects, mold, sprouting, disease, or other factors, including heat-damaged kernels.
Broken Corn and Foreign Material - All broken corn and foreign material screened from the sample, plus all matter other than corn which remains in the sample.

		Maximum Limits of …				
Grade	Minimum Test Weight Per Bushel	Heat-damaged Kernels	Damaged Kernels (Total)	Foreign Material	Splits	Soybeans of Other Colors
	Lbs.	%	%	%	%	%
U.S. No. 1	56.0	0.2	2.0	1.0	10	1.0
U.S. No. 2	54.0	0.5	3.0	2.0	20	2.0
U.S. No. 3	52.0	1.0	5.0	3.0	30	5.0
U.S. No. 4	49.0	3.0	8.0	5.0	40	10.0**

GRADE REQUIREMENTS FOR **SOYBEANS**

U.S. Sample Grade shall be designated for soybeans that:

a) Exceeds the limitations of U.S. No. 5 for any of the above factors; or
b) Contains, in a 1000 gram sample: 8 or more stones; 2 or more castorbeans; 8 or more cockleburs; 2 or more pieces of glass; 3 or more crotalaria seeds; 10 or more rodent pellets, bird droppings, or other pieces of animal filth; or
c) Has a musty, sour, or commercially objectionable foreign odor (does not include smut or garlic odor); or
d) Is heating, contains any commonly recognized harmful or toxic foreign substance, or is otherwise of distinctly low quality.

SPECIAL GRADES
Infested - Infested by live weevils or other live insects injurious to stored grain.
Garlicky - Five or more garlic bulblets in 1000 grams.

MARKET CLASSES
Yellow Soybeans - Soybeans with yellow or greenish seed coats with not more than 10% soybeans of other colors (black or brown).
Mixed Soybeans - Soybeans with more than 10% soybeans of other colors.

DEFINITIONS
Heat-damaged Kernels - Heat-damaged soybeans only.
Damaged Kernels (Total) - Kernels of soybeans only which are damaged by insects, mold, sprouting, disease, or other factors, including heat-damaged kernels.
Foreign Material - All foreign material screened from the sample, plus all matter other than soybeans which remains in the sample.
Splits - Broken pieces of soybeans that are not otherwise damaged.
Soybeans of Other Colors - Soybeans with black or brown seed coats.

GRADE REQUIREMENTS FOR **SORGHUM**					
		Maximum Limits of …			
Grade	Minimum Test Weight Per Bushel	Heat-damaged Kernels	Damaged Kernels (Total)	Foreign Material	Broken Kernels and Foreign Material
	Lbs.	%	%	%	%
U.S. No. 1	57.0	0.2	2.0	1.5	4.0
U.S. No. 2	55.0	0.5	5.0	2.5	7.0
U.S. No. 3	53.0	1.0	10.0	3.5	10.0
U.S. No. 4	51.0	3.0	15.0	4.5	13.0

U.S. Sample Grade shall be designated for sorghum that:

a) Exceeds the limitations of U.S. No. 4 for any of the above factors; or
b) Contains, in a 1000 gram sample: 8 or more stones; 2 or more castorbeans; 8 or more cockleburs; 2 or more pieces of glass; 3 or more crotalaria seeds; 10 or more rodent pellets, bird droppings, or other pieces of animal filth; or
c) Has a musty, sour, or commercially objectionable foreign odor (does not include smut or garlic odor); or
d) Is heating, contains any commonly recognized harmful or toxic foreign substance, or is otherwise of distinctly low quality.

0SPECIAL GRADES

Infested - Infested by live weevils or other live insects injurious to stored grain.
Smutty - Covered with smut spores, **or** contains 20 or more smut masses in 100 grams.

MARKET CLASSES

Sorghum - Sorghum with white subcoats and yellow, yellow-red, orange-red, salmon-pink, reddish or white pericarps, or white pericarps with black or reddish spots, with not more than three percent of tannin sorghum.

Tannin Sorghum - Sorghum with brown subcoats (tannin sorghum used in the contest will have only brown pericarps also) with not more than ten percent of sorghum of other colors.

White Sorghum - Sorghum with white pericarps with not more than two percent of sorghum of other colors. White sorghum with more than two percent sorghum (yellow, red, orange or salmon pericarps) and less than three percent tannin sorghum is classified as "Sorghum".

Mixed Sorghum - Sorghum and/or white sorghum with more than three percent tannin sorghum or tannin sorghum with more than ten percent of other colors.

DEFINITIONS

Heat-damaged Kernels - Heat-damaged kernels of sorghum and other grains.

Damaged Kernels (Total) - Kernels of sorghum and other grains which are damaged by insects, mold, sprouting, disease, or other factors, including heat-damaged kernels.

Foreign Material - All foreign material screened from the sample, plus all matter other than sorghum which remains in the sample.

Broken Kernels and Foreign Material - All broken kernels screened from the sample plus all foreign material as defined above.

| | | | | | Maximum Limits of … | | | |
| | Minimum Test Weight Per Bushel | Heat-damaged Kernels | Damaged Kernels (Total) | Foreign Material | Shrunken and Broken Kernels | Defects (Total) | Contrasting Classes |
Grade							
	Lbs.	%	%	%	%	%	%
U.S. No. 1	60.0	0.2	2.0	0.4	3.0	3.0	1.0
U.S. No. 2	58.0	0.2	4.0	0.7	5.0	5.0	2.0
U.S. No. 3	56.0	0.5	7.0	1.3	8.0	8.0	3.0
U.S. No. 4	54.0	1.0	10.0	3.0	12.0	12.0	10.0**
U.S. No. 5	51.0	3.0	15.0	5.0	20.0	20.0	-----

GRADE REQUIREMENTS FOR **WHEAT**

U.S. Sample Grade shall be designated for wheat that:

a) Exceeds the limitations of U.S. No. 5 for any of the above factors; or

b) Contains, in a 1000 gram sample: 4 or more stones; 2 or more castorbeans; 8 or more cockleburs; 1 or more pieces of glass; 3 or more crotalaria seeds; 2 or more rodent pellets, bird droppings, or other pieces of animal filth; or

c) Has a musty, sour, or commercially objectionable foreign odor (does not include smut or garlic odor); or

d) Is heating, contains any commonly recognized harmful or toxic foreign substance, or is otherwise of distinctly low quality.

**A sample with more than ten percent Contrasting Classes shall be classified Mixed Wheat and shall be graded with the factor Contrasting Classes disregarded.

SPECIAL GRADES
Light smutty - Strong odor of smut **or** 5 to 30 smut ball in 250 grams.
Smutty - More than 30 smut balls in 250 grams.
Garlicky - More than 2 garlic bulblets in 1000 grams.
Infested - Infested by live weevils or other live insects injurious to stored grain.

MARKET CLASSES
Hard Red Winter Wheat - Hard Red Winter Wheat with not more than ten percent of wheat of contrasting classes (Durum Wheat and/or White Wheat).
Mixed Wheat - Hard Red Winter Wheat with more than ten percent of wheat of contrasting classes.

DEFINITIONS
Heat-damaged Kernels - Heat-damaged kernels of wheat and other grains.
Damaged Kernels (Total) - Kernels of wheat and other grains which are damaged by insects, mold, sprouting, disease, or other factors, including heat-damaged kernels.
Foreign Material - All foreign material other than wheat which remains in the sample after removal of Shrunken and Broken Kernels.
Defects (Total) - The sum of Damaged Kernels (Total), Foreign Material, and Shrunken and Broken Kernels.
Contrasting Classes - Durum Wheat and/or White Wheat in Hard Red Winter Wheat

EXAMPLES

Note: The correctly written grade designations and determining factors for these examples are given on the following page.

1. *Sample of Hard Red Winter Wheat.*

Card Factors		Visual Factors	
Test Weight Per Bushel	62.5 lbs.	Heat-damaged HRW wheat	1.0%
3 garlic bulblets in 1000 grams		Sprout-damaged HRW wheat	1.5%
3 stones in 1000 grams		Mold-damaged soybeans	1.2%
Shrunken and Broken Kernels	6.0%	Undamaged Durum Wheat	5.0%
Odor of Smut			

Note: Four or more stones are required for Sample Grade; Damaged Kernels (Total) (including other grains), Foreign Material, and Shrunken and Broken Kernels must be added together to obtain Defects (Total); Mold-damaged soybeans must be added to Sprout-damaged and Heat-damaged wheat to obtain Damaged Kernels (Total), and added again as Foreign Material; 3 garlic bulblets causes special grade "Garlicky"; odor of smut causes special grade "Light Smutty."

2. *Sample of Yellow Corn.*

Card Factors		Visual Factors	
Test Weight Per Bushel	52.5lbs.	Insect-damaged corn	14.0%
Kerosene odor		Heat-damaged corn	2.5%
Broken Corn and Foreign Material sieved out 3.5%		Undamaged white corn	5.5%
8 cockleburs in 1000 grams			
3 live weevils			

Note: Insect damage and heat damage must be added together to obtain Damaged Kernels (Total) which is off table for Sample Grade; presence of live weevils causes special grade "Infested"; 5.5% white corn in yellow corn causes class "Mixed"; Kerosene odor is Commercially Objectionable; 8 cockleburs exceeds the limit for Sample Grade.

3. *Sample of Sorghum.*

Card Factors		Visual Factors	
Test Weight Per Bushel	55 lbs	Insect-damaged sorghum	7.0%
Dead insect bodies		Sprout-damaged wheat	1.5%
Kernels covered with smut spores		Giant ragweed seed	1.0%
Foreign Material sieved out	1.0%	Undamaged white sorghum	11.0%
Broken Kernels sieved out	4.5%	Undamaged tannin sorghum	2.5%

Note: Damaged wheat must be added to damaged sorghum for Damaged Kernels (Total); wheat and giant ragweed must be added to foreign material sieved out to get Foreign Material, which is then added to broken kernels sieved out to get Broken Kernels and Foreign Material; presence of smut spores causes special grade "Smutty"; 2.5% tannin sorghum in sorghum is not enough to cause class Mixed; any amount of white kernels are allowed in sorghum, thus class remains "Sorghum"; insects must be live to cause Infested special grade.

4. *Sample Yellow Soybeans*

Card Factors		Visual Factors	
Test Weight Per Bushel	51 lbs	Mold-damaged yellow soybeans	2.5%
Odor of garlic		Heat-damaged corn	1.5%
Foreign Material sieved out	2.0%	Undamaged black soybeans	10.9%
9 mouse pellets per 1000 grams			

Note: Damaged corn is not included as damaged kernels in soybeans; the corn is Foreign Material and must

be added to sieved Foreign Material; the black soybeans are Soybeans of Other Colors, but exceed 10% making class "Mixed", thus Soybeans of Other Colors column is disregarded; strong garlic smell does not cause special grade "Garlicky", there must be garlic bulblets; 10 pieces of animal filth are needed to make Sample Grade

Examples of proper abbreviations

Factor	Correct Abbreviation
Total Other Material	**TOM**
Test weight	**TW**
Damaged kernels (total)	**DKT**
Foreign material	**FM**
Heat damage	**HT**
Wheat of other classes	**WOCL**
Contrasting Classes	**CCL**
Broken corn and foreign material	**BCFM**
Commercially Objectionable Foreign Odor	**COFO**
Shrunken and broken kernels	**SHBN**

Example Answers
Commercial Grain Grading

Contestant No._____   Total Score_____

Contestant Name_____

(**NOTE: The following designations and factors are for the examples on the previous page.**)

Sample No.	Complete Grade Designation	Factor or Factors
1	U.S. No. 4 Hard Red Winter Wheat, Garlicky, Light Smutty	Heat-damaged Kernels (1.0%) Contrasting Classes (5.0%) Defects (Total) (10.9%)
2	U.S. Sample Grade Mixed Corn, Infested	Commercially Objectionable Foreign Odor Cockleburs Damaged Kernels (Total) (16.5%)
3	U.S. No. 3 Sorghum, Smutty	Damaged Kernels (Total) (8.5%) Foreign Material (3.5) Broken Kernels and Foreign Material (8.0%)
4	U.S. No. 4 Mixed Soybeans	Test Weight Per Bushel (51.0 lbs.) Foreign Material (3.5%)

Grain Grading worksheet

Wheat

Factor	%Lbs`	Grade
Test weight per bushel		
Heat Damaged Kernels		
Damaged Kernels (total)		
Foreign Material		
Shrunken and Broken Kernels		
Defects (Total)		
Contrasting classes		
Stones		
Castorbeans		
Cockleburs		
Glass		
Crotalaria Seeds		
Rodent Pellets		
Bird Droppings		
Animal filth		
Musty Odor		
Sour Odor		
Commercially Objectionable Foreign Odor		
Heating		
Harmful or Toxic Substance		
Distinctly low quality		

Market class

Hard Red Winter Wheat   Mixed wheat

Special grades

Infested   Light smutty   Smutty   Garlicky

Sorghum		
Factor	**%Lbs`**	**Grade**
Test weight per bushel		
Heat Damaged Kernels		
Damaged Kernels (total)		
Foreign Material		
Broken kernels and Foreign Material		
Stones		
Castorbeans		
Cockleburs		
Glass		
Crotalaria Seeds		
Rodent Pellets		
Bird Droppings		
Animal filth		
Musty Odor		
Sour Odor		
Commercially Objectionable Foreign Odor		
Heating		
Harmful or Toxic Substance		
Distinctly low quality		

Market class

Sorghum	Tannin sorghum	White sorghum	Mixed sorghum

Special grades

Infested   Smutty

Soybeans

Factor	%Lbs`	Grade
Test weight per bushel		
Heat Damaged Kernels		
Damaged Kernels (total)		
Foreign Material		
Splits		
Soybeans of Other Colors		
Stones		
Castorbeans		
Cockleburs		
Glass		
Crotalaria Seeds		
Rodent Pellets		
Bird Droppings		
Animal filth		
Musty Odor		
Sour Odor		
Commercially Objectionable Foreign Odor		
Heating		
Harmful or Toxic Substance		
Distinctly low quality		

Market class		
Yellow corn	White corn	Mixed corn
Special grades		
	Infested	Garlicky

Corn		
Factor	**%Lbs`**	**Grade**
Test weight per bushel		
Heat Damaged Kernels		
Damaged Kernels (total)		
Broken corn and foreign material		
Stones		
Castorbeans		
Cockleburs		
Glass		
Crotalaria Seeds		
Rodent Pellets		
Bird Droppings		
Animal filth		
Musty Odor		
Sour Odor		
Commercially Objectionable Foreign Odor		
Heating		
Harmful or Toxic Substance		
Distinctly low quality		
Market class		
Yellow corn	White corn	Mixed corn
Special grades		
	Infested	

APPENDIX C

2018 FFA Agronomy CDE Knowledge
Exam Study Questions

What is agronomy?
    A. the study of soil and crop management
    B. the study of crop improvement
    C. the study of general agriculture
    D. the study of the stars

On a plant stem, what is the space between two nodes called?
    A. blade
    B. collar
    C. internode
    D. spike

What is the name of the stalk that attaches a leaf to the stem of a broad-leafed plant?
    A. culm
    B. internode
    C. petiole
    D. sheath

To which category to the crops wheat, barley, oat, and rye belong?
    A. small grain crops
    B. oilseed crops
    C. root crops
    D. fiber crops

To which plant family does wheat belong?
    A.   Compositae
    B.   Gramineae
    C.   Leguminoseae
    D.   Malvaceae

To which plant family does canola belong?
    A.   Crucifereae
    B.   Gramineae
    C.   Leguminoseae
    D.   Malvaceae
To which plant family does alfalfa belong?
    A.   Crucifereae

B.   Gramineae
C.   *Leguminoseae*
D.   Malvaceae

To which plant family does peanut belong?
    A.   Crucifereae
    B.   Gramineae
    C.   *Leguminoseae*
    D.   Malvaceae

What is the scientific name of alfalfa?
    A.   Alfalfa
    B.   ***Medicago sativa***
    C.   *Trefoil repens*
    D.   *Zea mays*

What is the scientific name of corn?
    A.   *Glycine max*
    B.   *Medicago sativa*
    C.   *Triticum aestevium*
    D.   ***Zea mays***

What is the scientific name of soybean?
    A. ***Glycine max***
    B. *Soja max*
    C. *Trifoilium repense*
    D. *Gossypium hirsutum*

What is the scientific name of peanut?
    A. *Medicago sativa*
    B. ***Arachis hypogaea***
    C. *Glycine max*
    D. *Triticum aestevium*

What is the scientific name of cotton?
    A. *Brassica napus*
    B. *Arachis hypogaea*
    C. *Zea mays*
    D. ***Gossypium hirsutum***

What is the scientific name of wheat?
    A. ***Triticum aestevium***
    B. *Zea mays*
    C. *Glycine max*
    D. *Brassica napus*

Peanut production in the United States increased rapidly during the early 1900's when the boll weevil caused serious damage to which crop?
   A.   *Cotton*
   B.   Potato
   C.   Rice
   D.   Tobacco

What is a microscopic, slender, round worm that lives in the soil?
   A.   Bacteria
   B.   Fungi
   C.   *Nematode*
   D.   Virus

What is reached when a pest infestation reaches the point where the potential loss exceeds the cost of a chemical application?
   A.   Danger
   B.   *Economic Threshold*
   C.   I.P.M.
   D.   Spray Point

On which plant part do aphids feed?
   A.   Flowers
   B.   Leaves
   C.   *Plant sap*
   D.   Roots

What is the most common beneficial insect species associated with crop production?
   A.   *Lady beetle*
   B.   Parasitic wasp
   C.   Praying mantis
   D.   Walking stick

What is the localized death of leaf tissue termed?
   A.   Chlorosis
   B.   Firing
   C.   *Necrosis*
   D.   Rusting

Which organism causes most plant diseases?
   A.   Bacteria
   B.   *Fungi*
   C.   Nematodes
   D.   Virus

Which of the following can be detected on a crop when exposed to a black light?
- A. leaf blight
- *B. aflatoxin*
- C. cyst nematodes
- D. all of these

Which grass species is a cool season, annual and is classified as a restricted noxious weed?
- *A. cheat*
- B. common lambsquarter
- C. johnsongrass
- D. wild mustard

Which of the following is a prohibited noxious weed in Oklahoma?
- *A. yellow nutsedge*
- B. cheat
- C. barnyardgrass
- D. rescuegrass

Bacteria from which genera form associations with legumes, to give the ability to make use of atmospheric nitrogen?
- A. *Aspergillus*
- B. *Bacillus*
- C. *Nitrosomonus*
- D. ***Rhizobium***

Which of the following describe the process of inoculation?
- A. Applying nitrogen fertilizer
- *B. Applying bacteria that fix nitrogen*
- C. Applying bacteria that raise soil pH
- D. Removing nitrogen fertilizer

How can you determine if nitrogen-fixing bacteria have infected your legume crop?
- A. Internodes are present
- b. Nodes are present
- *C. Nodules are present*
- D. Root hairs are present

Which of the following terms describes a herbicide application that is made after planting and before crops and weeds emerge?
- A. Post-emergence
- *B. Pre-emergence*
- C. Pre-plant
- D. Lay by

Which of the following determines the rate of pesticide that is applied per acre?
  A.   Effective spray width per nozzle
  B.   Ground speed of the sprayer
  C.   Nozzle flow rate
  D.   *All of the above*

Which of the following types of sprayer nozzles allows for the penetration of the plant canopy and covers the underside of the leaves?
  A.   Flat fan
  B.   *Hallow cone*
  C.   Jet band
  D.   Z – Bird

Where will a deficiency of any "primary plant nutrient" first appear?
  A.   *Lower leaves*
  B.   Roots
  C.   Upper leaves
  D.   Younger leaves

What is the first visual symptom of a plant suffering from a deficiency of nitrogen?
  A.   *Chlorosis*
  B.   Dampening-off
  C.   Rickets
  D.   Wilting

What does the term "chlorosis" mean?
  A.   Cupping of the leaves
  B.   Wilting of the blooms
  C.   Wilting of the leaves
  D.   *Yellowing of the leaves*

Which of the following is a visual sign associated with phosphorus deficiency?
  A.   Curling leaves
  B.   *Purple leaves*
  C.   Weak stems
  D.   Yellow leaves

Nitrogen, phosphorus and potassium are referred to as what type of plant nutrients?
  A.   Essential
  B.   Micro
  C.   *Primary*
  D.   Secondary

Calcium, magnesium and sulfur are referred to as what type of plant nutrients?
  A.   Essential
  B.   Micro

C.   Primary
D.   Secondary

On a world-wide basis, what is the most limiting nutrient element for plant growth?
A.   Nitrogen
B.   Phosphorus
C.   Potassium
D.   Sunlight

Which primary plant nutrient promotes rapid vegetative growth?
A.   Iodine
B.   Nitrogen
C.   Phosphorus
D.   Potassium

What is the function of phosphorus in a plant?
A.   Energy transfer
B.   Increasing crop quality
C.   Reduces lodging
D.   All of these

What is the symbol for the element responsible for improving stem strength?
A.   Ca
B.   Fe
C.   K
D.   P

Alfalfa uses large amounts of which element?
A.   Chloride
B.   Magnesium
C.   Potassium
D.   Sulfur

Peanut requires large amounts of which element?
A.   Aluminum
B.   Calcium
C.   Iron
D.   Zinc

Relative to wheat, canola requires more of which element?
A. sulfur
B. calcium
C. zinc
D. manganese

What is the primary material used to provide calcium to crop?
  A.   *Agricultural Lime*
  B.   Calcium nitrate
  C.   Calcium oxide
  D.   Calcium sulfate

Which of the following forms of agricultural lime should be used if magnesium is also needed in the soil?
  A.   Calcite
  B.   *Dolomite*
  C.   Potash
  D.   Slag

When should a crop producer place the seed in direct contact with fertilizer?
  A.   Always
  B.   When the soil is very cold
  C.   When the soil is very wet
  D.   *Never*

What should a crop producer do to determine how much fertilizer to apply to a field?
  A.   Texture the soil
  B.   Sample the air nutrient content
  C.   Test the fertilizer nutrient content
  D.   *Test the soil nutrient content*

When should agricultural lime be applied?
  A.   At bloom
  B.   At germination
  C.   *Before planting*
  D.   During irrigation

What is likely to occur when too much fertilizer is applied to a field?
  A.   *Crop toxicity*
  B.   Increased crop vigor
  C.   Increased crop yield
  D.   Faster plant maturity

What is the minimum percentage of plant food in a fertilizer is referred to as?
  A.   Grade
  B.   *Guaranteed analysis*
  C.   Ratio
  D.   Quality

Which of the following is an example of an organic fertilizer?
  A.   Ammonium nitrate

B.   Dolomite
C.   *Poultry litter*
D.   Sodium nitrate

What is vegetation produced with the intent of plowing it into the soil to improve the organic matter content termed?
A.   Fodder
B.   *Green manure*
C.   Humus
D.   Stubble

How is the quality of an agricultural lime material measured?
A.   Cation Exchange Capacity (CEC)
B.   *Effective Calcium Carbonate Equivalent (ECCE)*
C.   Guaranteed Analysis
D.   County Extension Office

What is the application of fertilizers, herbicides and/or insecticides through irrigation systems called?
A.   *Chemigation*
B.   Fertilization
C.   Irrigation
D.   Pestigation

You are going to divide your yearly application of fertilizer into two or more applications. What is the term for this type of application?
A.   Banding
B.   Broadcasting
C.   *Split application*
D.   Starter

What is the process of spreading fertilizer uniformly over the soil's surface called?
A.   Banding
B.   *Broadcasting*
C.   Foliar application
D.   Top dressing

What is applying fertilizer a little deeper and to the side of where the seeds are planted termed?
A.   *Banding*
B.   Side dressing
C.   Split application
D.   Top dressing

Where does the manufacturer get nitrogen from to produce anhydrous ammonia:
A.   Organic matter
B.   Rocks high in nitrogen

C.   *The atmosphere*
D.   None of these

Fertilizer materials marketed in the United States are given a three digit rating such as 10-20-10. What does the first digit represent?
A.   Carbon
B.   *Nitrogen*
C.   Phosphorus
D.   Potassium

Fertilizer materials marketed in the United States are given a three digit rating such as 10-20-10. What does the third digit represent?
A.   Iron
B.   Nitrogen
C.   Phosphorus
D.   *Potash*

What is the guaranteed analysis for urea?
A.   21-0-0
B.   35-0-0
C.   **46-0-0**
D.   82-0-0

What is the guaranteed analysis of diammonium phosphate?
A.   0-16-0
B.   0-48-0
C.   11-48-0
D.   **18-46-0**

What is the ideal soil pH for most agronomic crops?
A.   4.5 to 5.5
B.   5.5 to 6.0
C.   *6.5 to 7.0*
D.   7.0 to 8.0

Which of the following soils would require the least amount of agricultural lime to adjust the soil pH?
A.   Loam
B.   Loamy sand
C.   Sandy loam
D.   *Sand*

Which of the following irrigation systems loses the least amount of water to evaporation and drift?
A.   Center pivot
B.   Flood
C.   *Microirrigation*
D.   Traveling gun

Which of the following irrigation systems is the most expensive to purchase?
A. *Center pivot*
B. Flood
C. Lateral move
D. Traveling gun

Which of the following soil textural classes is best suited for peanut production?
A. Clay loam
B. Loam
C. *Sandy loam*
D. Silt loam

Soils with which surface texture are more likely to have a poor rate of seedling emergence due to "crusting" of the soil.
A. Clay
B. Loam
C. Sand
D. *Silt*

How many soil cores should a farmer obtain to create an adequate soil sample for testing in a 40 acre field?
A. 1 – 10
B. *15 – 25*
C. 40 – 50
D. 75 – 100

What is a benefit of leaving soil fallow?
A. *Conserve soil moisture*
B. Control erosion
C. Control weeds
D. Improve soil structure

On a world-wide basis, what is the most limiting factor for plant growth?
A. Nitrogen
B. Phosphorus
C. Potassium
D. *Water*

During which of the following stages of crop development is water availability most important?
A. *Flowering*
B. Maturity

C.   Vegetative growth
D.   All of these

Where are most peanuts produced in the state of Oklahoma?
A.   Eastern
B.   Northern
C.   Southern
D.   Western

Where is most corn produced in the state of Oklahoma?
A.   Northeastern
B.   Panhandle
C.   Southwestern
D.   Central

Where are most soybeans produced in the state of Oklahoma?
A.   Northeastern
B.   Panhandle
C.   Southwestern
D.   Central

Where is most alfalfa produced in the state of Oklahoma?
A.   in the eastern part of the state
B.   in the northern part of the state
C.   in the southern part of the state
D.   in the western part of the state

Which of the following is a primary tillage activity?
A.   Disking
B.   Harrowing
C.   Plowing
D.   Spraying

Which of the following is a secondary tillage activity?
A.   Culti-packing
B.   Disking
C.   Harrowing
D.   Plowing

During which month should alfalfa be planted in Oklahoma?
A.   January
B.   April
C.   August
D.   November

During which month should wheat be planted in Oklahoma?

A.   January
B.   April
C.   *September*
D.   July

During which month should sorghum be planted in Oklahoma?
A.   January
B.   *May*
C.   August
D.   November

During which month are peanuts harvested in Oklahoma?
A.   April
B.   June
C.   August
D.   *October*

During which month is canola harvested in Oklahoma?
A.   April
B.   *June*
C.   August
D.   October

Which of the following is grown as a perennial crop in Oklahoma?
A.   *alfalfa*
B.   canola
C.   sesame
D.   soybean

Which of the following is grown as a winter annual crop in Oklahoma?
A.   *canola*
B.   corn
C.   sesame
D.   soybean

Which of the following is grown as a summer annual crop in Oklahoma?
A.   alfalfa
B.   canola
C.   *corn*
D.   wheat

Which type of root system does cotton have?
A.   Adventitious
B.   Crownal
C.   Fibrous
D.   *Tap*

Which type of root system does wheat have?
- A.   Crownal
- *B.   Fibrous*
- C.   Lateral
- D.   Tap

What is the seed part that supplies energy to the seedling until the seedling is able to produce sufficient energy through photosynthesis?
- *A.   Cotyledon*
- B.   Embryo
- C.   Radicle
- D.   Testa

What is the seed structure that protects a grass seedling during emergence called?
- *A.   Coleoptile*
- B.   Flag leaf
- C   Peduncle
- D.   Radicle

Peanut pods are produced from which plant part?
- A.   Leaves
- *B.   Flowers*
- C.   Roots
- D.   Stems

Which term refers to the ability of seeds to begin growing when placed in a favorable environment?
- A.   Germination
- B.   Pollination
- C.   Scarification
- *D.   Viability*

Which term describes the process of exposing a plant to a cold period to cause a change from vegetative growth to reproductive growth?
- A.   Chilling
- B.   Scarification
- C.   Stratification
- *D.   Vernalization*

Which of the following is true of indeterminate plants?
- A.   All of the seeds mature at the same time
- *B.   The seeds mature at different times*
- C.   The seeds take multiple growing seasons to mature
- D.   The seeds never mature

To facilitate mechanical harvesting of small grains the plant should be standing upright. What term describes a situation when the stems of wheat plants, and other small grains, bend over due to weakness of the stem and/or the weight of the seed head?
- A. Drooping
- *B.* *Lodging*
- C. Nodding
- D. Weeping

Which of the following crops is a farmer likely to consider as a possibility if he/she desires to "double crop" his/her wheat?
- A. Barley
- B. Corn
- C. Oats
- *D.* *Soybeans*

What is "Feekes Scale" used for?
- A. Calculate the value of a farmer's truck load of wheat
- *B.* *Describe the growth stages of wheat*
- C. Determine when wheat is ready for harvest
- D. Establish the official weight of a bushel of wheat.

Most of the wheat produced for grain is destined to be made into flour. What is hard red winter wheat flour best suited for making?
- A. Cookies
- *B.* *Breads*
- C. Pastas
- D. Tortillas

Which plant structure is most important to identify wheat from rye, barley, and triticale while in the vegetative stage?
- *A.* *Auricle*
- B. Blade
- C. Collar
- D. Ligule

Which class of wheat is most commonly grown by Oklahoma farmers?
- A. Hard red spring wheat
- *B.* *Hard red winter wheat*
- C. Hard white wheat
- D. Soft red winter wheat

Approximately how long can a pure stand of alfalfa be expected to persist in Oklahoma?
- A. 6 months

B.   3 years
C.   6 years
D.   20 years

After an alfalfa field has outlived its productive life, what is the minimum recommended time that needs to pass before replanting the field to alfalfa again?

A.   One year
B.   Two years
C.   Four years
D.   Eight years

How is alfalfa used?

A.   Green Chop
B.   Hay
C.   Silage
D.   Any of these

What is the term given to harvested peanut pods that are empty?

A.   Blanks
B.   Duds
C.   Pops
D.   Shells

Which of the following is an advantage of growing peanut on soil that has a high sand content?

A.   Easy harvest
B.   Less weed competition
C.   Low nutrient holding capacity
D.   Low water holding capacity

Peanut production in Oklahoma has dropped drastically since the year 2000. Why?

A.   Development of Verticillium wilt in Oklahoma peanut
B.   Elimination of the quota marketing system for peanut
C.   Infestation of fall armyworms in Oklahoma peanut
D.   Recognition that many children are allergic to peanut

Which of the following is the primary market type of peanut produced in Oklahoma?

A.   Runner
B.   Spanish
C.   Valencia
D.   Virginia

What is the primary use of Runner market type peanuts?

A.   Circus peanuts (roasted and sold in the shell)
B.   High quality peanut candies and salted nuts
C.   Processed into peanut butter
D.   Snack food (roasted and then shelled)

Which of the following is an advantage of rotating peanuts with a non-legume crop?
    A.   Fewer problems with plant diseases
    B.   Fewer problems with insect pest
    C.   Fewer problems with weeds
    D.   All of these

Canola has epigeal emergence. How does that affect canola's tolerance to frost/freeze damage relative to wheat?
    A.   Canola is less susceptible
    B.   Canola is more susceptible
    C.   Canola is not susceptible
    D.   There is no difference

With which implement should canola be planted?
    A.   Broadcast seeder
    B.   Grain drill
    C.   Row crop planter
    D.   All of these are recommended planting implements

What is the standard weight of a bushel of canola?
    A.   50 pounds
    B.   55 pounds
    C.   60 pounds
    D.   65 pounds

What is the standard weight of a bushel of wheat?
    A.   50
    B.   56
    C.   **60**
    D.   65

What is the standard weight of a bushel of corn?
    A.   50
    B.   **56**
    C.   60
    D.   65

If you are checking wheat prices in your local news paper, what is the quality grade being quoted?
    A. U.S. No. 1
    B. U.S. No. 2
    C. U.S. No. 3
    D. U.S. Sample Grade

What information can be accessed from the Mesonet?
    A. air temperature

B. soil temperature

C. soil moisture

D. all of these

Which scientist greatly increased wheat production and is called the "Father of the Green Revolution"?

A.   Norman Borlaug

B.   George Washington Carver

C.   Gregor Mendel

D.   Booker T. Washington

Who is recognized as the "Father" of the nitrogen fertilizer industry?

A.   Fritz Haber

B.   John Laws

C.   Justus von Liebig

D.   Cyrus McCormick

Which scientist researched and developed over 300 uses for peanut?

A.   Norman Borlaug

B.   George Washington Carver

C.   Gregor Mendel

D.   Booker T. Washington

Example Calculations. Answers should be rounded to the nearest tenth unless otherwise instructed

1. You have a field that is 0.5 mile long and 0.3 mile wide. What is the area of your field in acres?

$$0.5*0.3*5280*5280 \div 43560 = 96 \text{ acres}$$

2. You want to plant winter wheat on a 90-acre field. Your planting rate will be 1.5 bushel per acre. How many 50-pound bags of wheat will you need to purchase? (You should assume 1 bushel weighs 60 pounds.)

$$90*1.5*60 \div 50 = 162 \text{ bags}$$

3. Calculate the percent pure live seed of wheat seed that has 92% germination and 94% purity.

$$.92*.94 = .8648 = 86$$

$$.5\%$$

4. How many pounds of urea do you need to apply per acre to add 60 pounds of nitrogen per acre?

$$60 \div .46 = 130.4 \text{ pounds}$$

5. How many pounds of phosphorus per acre will you add to the soil if you apply 40 pounds of diammonium phosphate per acre?

$$40 * .46 = 18.4 \text{ pounds}$$

6. You need to apply 40 pounds of monoammonium phosphate per acre to a 120-acre field. How many times will you need to fill your 2-ton fertilizer cart? (1 ton = 2000 pounds)

$$120 * 40 \div 4000 = 1.2 = \text{two times}$$

7. You want to apply the herbicide Sencor to your wheat field to control cheat. Sencor should be applied at a rate of 4 ounces per acre. How many pounds of Sencor will be required to treat 250 acres?

$$250 * 4 \div 16 = 62.5$$
pounds

8. You want to apply atrazine to your grain sorghum at a rate of 2.0 pounds per acre. Atrazine is the active ingredient in the herbicide Aatrex, which contains 4 pounds of atrazine per gallon. How many gallons of Aatrex should you purchase to treat 45 acres?

$$45 * 2 \div 4 = 22.5$$
gallons

9. You decide it's time to treat your winter canola field to control insects. You decide to use the insecticide Karate Z. This product is applied at a rate of 0.03 pounds of active ingredient (lambda cyhalothrin) per acre. If Karate Z contains 22.8% active ingredient, how many pounds of Karate Z should you apply per acre?

0.13 lbs of Karate Z / Acre

$$\frac{0.03 \text{ lbs A.I.}}{0.228 \text{ lbs A.I}} = 0.13 \text{ lbs of Karate Z}$$

10. You want to apply the fungicide Bravo WeatherStik at a rate of 2 pints per acre to control leaf spot in your 65-acre peanut field. How much will it cost (rounded to the nearest cent) to purchase Bravo WeatherStik for this field, if the fungicide costs $5.75 per pint?

$$65*2*5.75=\$747.50$$

11. You have constructed a grain bin so you can store wheat on your farm at harvest. The bin has a 30-foot diameter and sides 35 feet tall. If you fill the bin to the top of the sides, how many bushels will you be able to store in the bin?

$$3.14*15^2*35\div1.2=20,606.3 \text{ bushels } (20,616.7 \text{ if more digits of pi are used})$$

12. Your wheat harvest from a 90-acre field is 3,948 bushels. What is your average yield in bushels per acre?

$$3948\div90=43.9 \text{ bushels per acre}$$

Common Conversion Factors

1 foot = 12 inches
1 mile = 5280 feet
1 acre = 43,560 square feet

1 pound = 16 ounces

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts

1 bushel = 1.2 cubic fee